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munication by describing his mode of examining delicate anatomical structures :—He procures a hollow sphere of glass, between two and three inches in diameter, of which one fourth is cut off at the open part, and the edges ground so as to fit upon a plate of glass to which the object is attached and immersed in water; the sphere is then filled with water, and inverted over the object upon the plate. The whole being withdrawn from the basin the object may be examined, and the portion of the sphere filled with water furnishes a convenient magnifying power.

A New Method of Solving Numerical Equations of all Orders, by continuous Approximation. By W. G. Horner, Esq. Communicated by Davies Gilbert, Esq. F.R.S. Read July 1, 1819. [Phil. Trans. 1819, p. 308.]

The process which the author endeavours to establish in this essay, being the leading theorem in the calculus of derivations, presented under a new aspect, may, he says, be regarded as an universal instrument of calculations, extending to the composition as well as analysis of functions of every kind, but it promises to be especially useful in the numerical solution of equations.

Mr. Horner then proceeds to the illustration of his method, and to explain the investigations to which it is applicable, by details which do not admit of explanation.

An Account of Experiments for Determining the Variation in the Length of the Pendulum Vibrating Seconds, at the principal Stations of the Trigonometrical Survey of Great Britain. By Captain Henry Kater, F.R.S. Read June 24, 1819. [Phil. Trans. 1819, p. 337.]

In this communication Captain Kater, having noticed the circumstances to which his researches owe their origin, proceeds to detail his investigations, and to describe the implements and apparatus employed in his various inquiries; the construction of the pendulum and its appendages is minutely explained, as also the rate of its expansion for each thermometric degree, whence is deduced the corresponding correction to be applied to the number of its vibrations. The operations at each station, with their results, are enumerated at length, and illustrated by numerous tables. The length of the seconds pendulum for the latitude of London is 39·13722 inches in parts of the scale which forms the basis of the trigonometrical survey; for the latitude of Unst 39·16939 inches, of Portsay 39·15952, of Leith Fort 39·15347, of Clifton 39·14393, of Arbury Hill 39·14043, and of Shanklin Farm 39·13407 inches. The calculation of the latitude of each of these stations is given at length, to afford the opportunity of any further examination desirable on that subject; but these and the other details relating to calculation do not admit of abridgement.

Captain Kater concludes this paper with some observations re-

specting the figure of the earth. It having been shown by Clairaut that the sum of the two fractions, expressing the ellipticity and the diminution of gravity, from the pole to the equator, is always a constant quantity, and equal to $\frac{2}{3}$ of the fraction, expressing the ratio of centrifugal force, and that of gravity at the equator, it follows that if the decrease of gravity from the pole to the equator be subtracted from this constant quantity, the remaining fraction will express the ellipticity of the spheroid. The diminution of gravity may be known by finding the difference of the length of two pendulums, vibrating in equal times at the equator and pole, which are to each other directly as gravitation; but as such experiments cannot be made at the pole, Captain Kater proceeds to describe the means of obtaining the desired result by observations at intermediate stations; whence it appears that the length of the seconds pendulum at the equator, deduced from the observations at Unst and Dunnose, is 39.00527 inches, and gravitation at the equator 16.040 feet; hence the centrifugal force at the equator is $\frac{1}{288}$ of gravitation, or $\frac{1}{288}$ of gravity, which last being multiplied by $\frac{2}{3}$ gives .0086505 for the sum of the fractions, expressing the ellipticity of the earth and diminution of gravity from the pole to the equator.

It appears from this result that, excepting the allowance for height above the sea's level, the error in the number of vibrations of the seconds pendulum at any particular station does not amount to $\frac{1}{1000000}$ th of a vibration, which is about equal to 400,000th part of the length, consequently gravitation may be determined to this degree of accuracy by the apparatus employed; and in passing through a country composed of materials of various degrees of density, the pendulum may be expected to indicate such variations with much precision. Irregularities that are observed in the decrease between given latitudes, from the pole to the equator, are referable to this irregular attraction; thus the sudden increase of gravitation at Arbury Hill is referred by Captain Kater to the granite of Mount Sorrel in Leicestershire.

Though the details of M. Biot's experiments are not yet published, the author observes that it affords him no small gratification to learn that the acceleration of the pendulum between London and Unst, computed by that mathematician from his observations between Unst and Formentara, differs only 0".6 from the result of his own experiments,—a difference referable perhaps to the superior density of Unst compared with that of the substrata of London.

The Croonian Lecture. A further Investigation of the Component Parts of the Blood. By Sir Everard Home, Bart. V.P.R.S. Read November 4, 1819. [Phil. Trans. 1820, p. 1.]

In this communication Sir Everard announces the existence in certain animal structures of globules smaller than and independent of those ordinarily belonging to the blood; they were first remarked by Mr. Bauer, during the microscopic examination of the